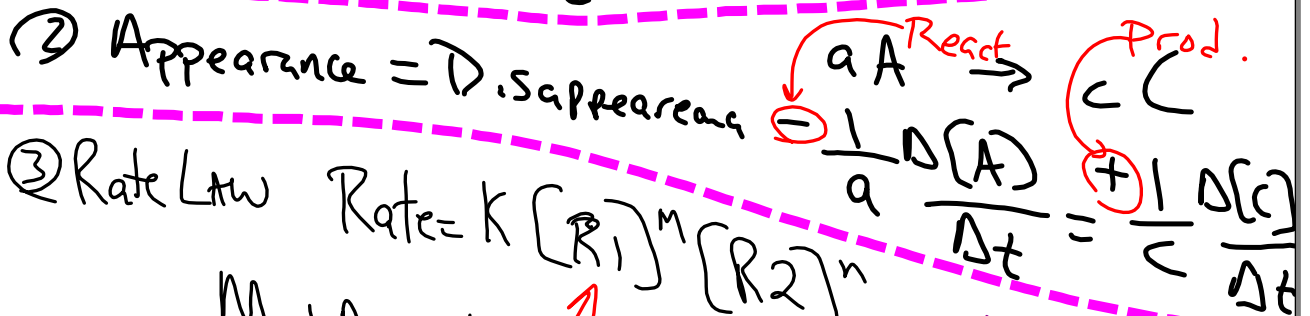


Chap 14 So Far .....

① Rate =  $\frac{\Delta [ ]}{\Delta t} = \frac{M}{\text{sec}}$



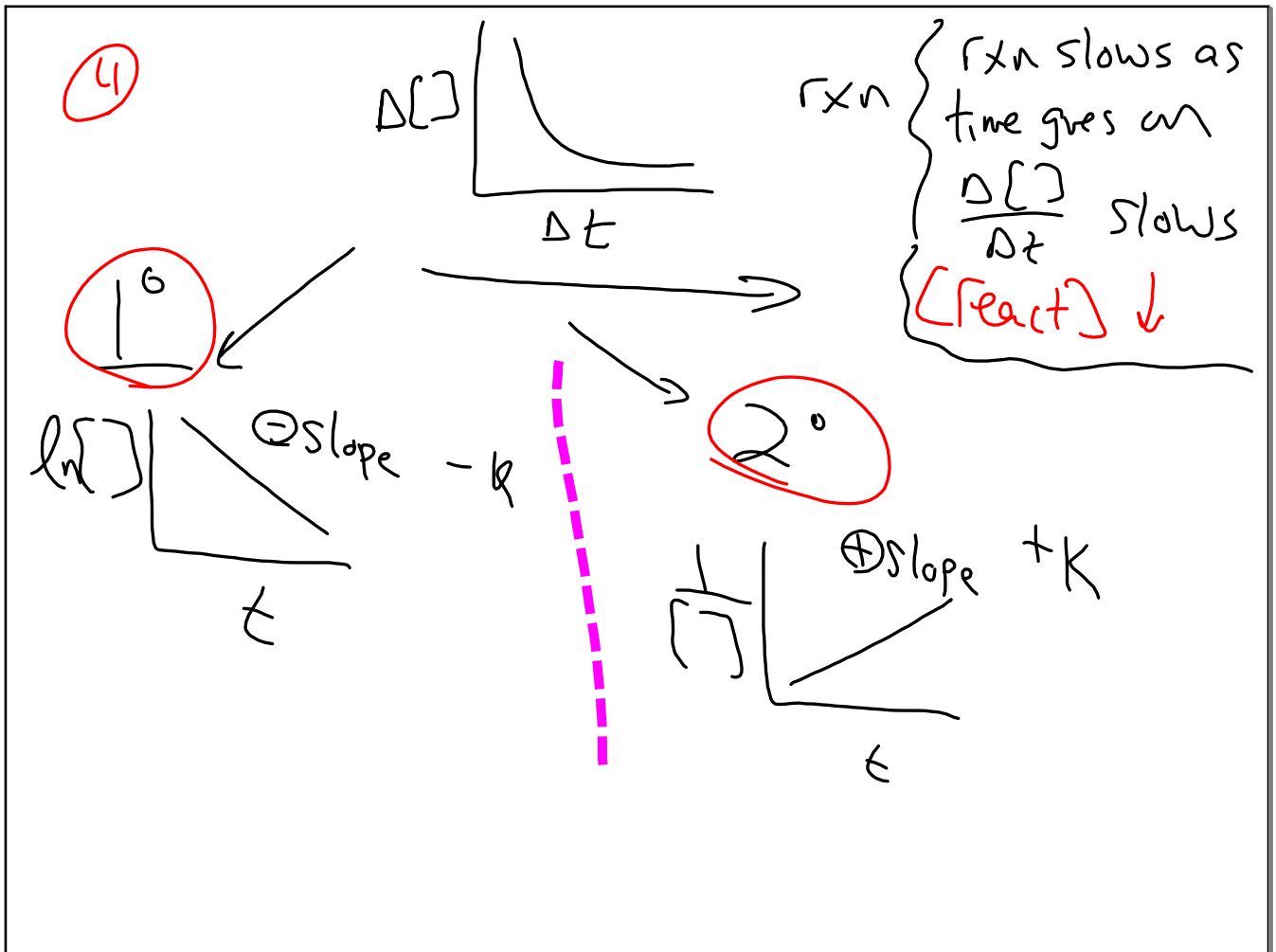
③ Rate Law  $\text{Rate} = k [R_1]^m [R_2]^n$

$m + n = \text{overall order of rxn}$

Data Table

ONLY reactants

$\Delta [ ]$	$\Delta t$	$r_{\text{fp}}$
2	3	8
2	≠	8



How time effects [reactant]

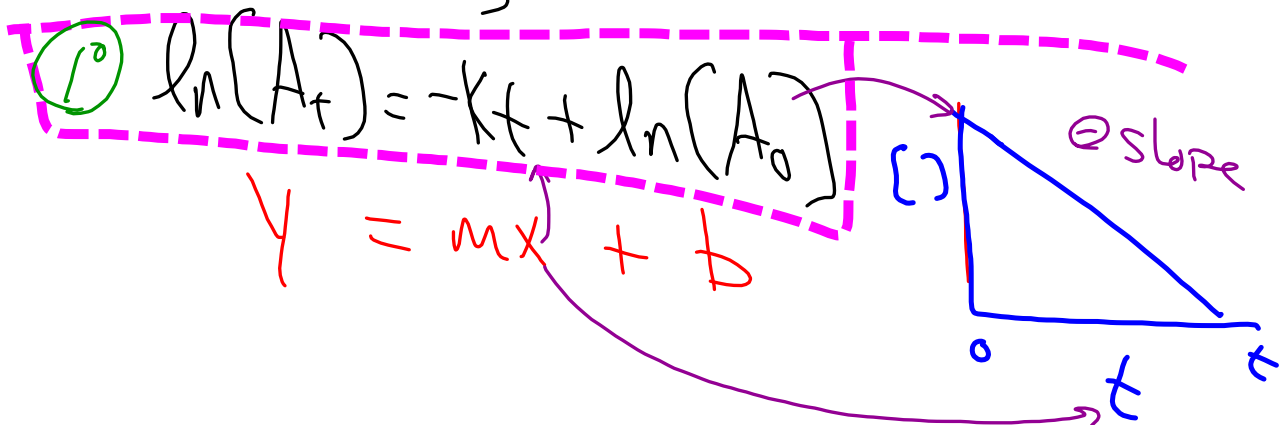
Start time  $[A_0]$   $\xrightarrow{\text{elapsed time}}$  end time  $[A_t]$

1<sup>o</sup>

$\Delta [ ]$

$$\ln[A_t] - \ln[A_0] = -kt$$

$$\ln \frac{[A_t]}{[A_0]} = -kt$$



$$1^{\circ} \quad \ln[A_t] = -\underline{K}t + \ln[A_0]$$

$$K = \text{sec}^{-1} \text{ or } \frac{1}{\text{sec}} \text{ or } \frac{1}{M^0 \times \text{sec}}$$

$$2^{\circ} \quad \frac{1}{[A_t]} = \underline{K}t + \frac{1}{[A_0]}$$

end

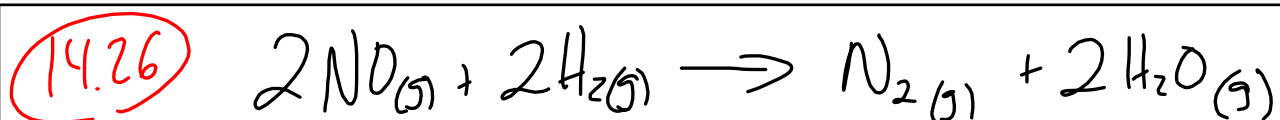
elapsed  
time

starts

$M^0 \times \text{sec}$   
(order - 1)

$M^1 \times \text{sec}$

$M^{-1} \times \text{sec}^{-2}$



a)  $\text{Rate} = k [\text{NO}]^2 [\text{H}_2]^1$

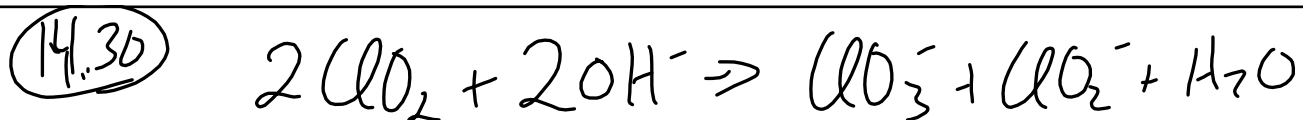
b)  $\text{Rate} = (6 \times 10^4) (0.035)^2 (0.015)^1$

c)  $\text{Rate} = (6 \times 10^4) (0.1)^2 (0.01)$

3<sup>rd</sup> order

$$k = \frac{1}{\text{M}^2 \cdot \text{sec}}$$

$$k = 6 \times 10^4$$



⑨  $\text{Rate} = k [\text{CO}_2]^2 [\text{OH}^-]^1$

DATA TABLE

2 → 1  
[CO<sub>2</sub>]

3

②

=

Rate  
9



2 - 3

[OH]

Rate

3

=

3

$$\textcircled{b} \quad \boxed{\text{Rate} = k [\text{CO}_2]^2 [\text{OH}^-]^1}$$

$$0.0248 = k (0.06)^2 (0.03)^1$$

$$\boxed{k = 2.3 \times 10^2} \quad \frac{1}{\text{M}^2 \cdot \text{Sec}} \text{ or } \text{M}^{-2} \text{Sec}^{-1}$$

$$\textcircled{c} \quad \text{Rate} = (2.3 \times 10^2) (0.11)^2 (0.05) = 0.12 \text{ M/Sec}$$

$$\left. \begin{array}{l} t = [A_0] \\ \text{half} \\ \text{life} = \frac{1}{2}[A_0] \end{array} \right\} \begin{array}{l} \ln A_t = -kt + \ln A_0 \\ \ln\left(\frac{1}{2}A_0\right) = -kt + \ln A_0 \end{array}$$

$$\ln \frac{1}{2}A_0 - \ln A_0 = -kt$$

$$\ln \frac{\cancel{\frac{1}{2}A_0}}{\cancel{A_0}} = -kt$$

$$\ln \frac{1}{2} = -kt_{\frac{1}{2}}$$

$$0.693 = -kt_{\frac{1}{2}}$$

$$\rightarrow t_{\frac{1}{2}} = \frac{0.693}{k}$$



$$14 / 38 + 40$$